

IN THE CLAIMS:

The following is a complete listing of the claims, and replaces all earlier listings and all earlier versions.

1. (Currently Amended) An apparatus for generating characterization data characterizing features in an image comprising:

an image data receiver for receiving data representative of an image;

a feature detector for detecting the presence of features represented by image data received by said image data receiver, said feature detector being arranged to determine, for image data representative of a plurality of different sized regions of an image, values representative of the presence of features in said the regions; and

an image point characteriser characterizer for characterizing image points selected as being representative of features in said the image data on the basis of said the detection by said feature detector, by calculating characterization values for said the features, wherein said the characterization values are determined utilizing image data for regions of the image including said the feature, and wherein said image point characteriser characterizer is arranged to determine said characterization values on the basis of image data for different sized regions, said the size of said the region being selected on the basis of the size of a said region utilized to detect the said feature by said feature detector.

2. (Currently Amended) Apparatus in accordance with claim 1, wherein said apparatus is arranged to associate with each of said the plurality of different sized regions for determination of the presence of features, a size of region to be utilized to

determine characterization values for features detected utilizing said the different sized regions.

3. (Currently Amended) Apparatus according to claim 1, wherein said image point characteriser characterizer is arranged to select the size of region to be used to calculate the characterization values for a feature from a plurality of predetermined sizes, the selected size increasing as the size of the region used by the feature detector to detect said the feature increases.

4. (Currently Amended) Apparatus in accordance with any of claim 1, wherein said feature characteriser characterizer is arranged to characterize each said region in a manner which is substantially independent of transformations resulting in linear distortions of the portion of said the image including said that region.

5. (Currently Amended) Apparatus in accordance with any of claim 1, wherein said feature characteriser characterizer is arranged to characterize each said region in a manner which is substantially independent of rotational transformations of the portion of said the image including said that region.

6. (Currently Amended) Apparatus in accordance with claim 5, wherein said feature characteriser characterizer is arranged to utilize a substantially circular region to characterize a feature wherein the size of said the circular region is selected on the basis of the size of said the feature detected by said feature detector.

7. (Currently Amended) Apparatus in accordance with claim 1, further comprising a correspondence identifier for identifying the correspondence between features in a pair of images, wherein said ~~corresponding~~ correspondence identifier is arranged to determine a match between features in ~~said~~ the pair of images characterized by said feature ~~characteriser~~ characterizer.

8. (Currently Amended) Apparatus in accordance with claim 1, further comprising:

a data store for storing characterization values for features in a plurality of images; and

a correspondence identifier, said correspondence identifier being arranged to determine a match between characterization values determined by said feature ~~characteriser~~ characterizer for data representative of an image received by said image data receiver and stored characterization values stored in said data store.

9. (Currently Amended) An apparatus for generating a three-dimensional model of an object comprising:

apparatus for identifying a correspondence between features in pairs of images in accordance with claim 7;

a viewpoint determinator for determining on the basis of correspondence of features in pairs of images the relative positions from which ~~said~~ the images have been obtained; and

a model generator for generating a three-dimensional model of an object utilizing said the image data received by said image data receiver and said the relative positions determined by said viewpoint determinator.

10. (Currently Amended) In an apparatus for generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;

detecting the presence of features in the images represented by stored image data utilizing a plurality of different sized regions of said the images to determine values representative of the presence of features in said the image data;

characterizing image points selected as being representative of features in said the image data on the basis of said the values, utilizing different sized regions of said the images for said the image points wherein the size of a region used to characterize [[and]] an image point is selected on the basis of the size of the region utilized to determine a value representative of the presence of features in said the image data for said the image point, and

matching said the features utilizing said the characterizations.

11. (Currently Amended) In an apparatus for processing data defining images of an object to generate a three-dimensional computer model of the object by matching features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface of the object using the calculated viewpoints, a method of performing the processing to match the features in the images comprising:

storing image data;

detecting the presence of features in the images represented by stored image data utilizing a plurality of different sized regions of said the images to determine values representative of the presence of features in said the image data;

characterizing image points selected as being representative of features in said the image data on the basis of said the values, utilizing different sized regions of said the images for said image points wherein the size of a region used to characterize [[and]] an image point is selected on the basis of the size of the region utilized to determine a value representative of the presence of features in said the image data for said the image point;

and

matching said the features utilizing said the characterizations.

12. (Currently Amended) A method of generating characterization data characterizing features in an image comprising the steps of:

receiving image data;

detecting the presence of features represented by received image data by determining for image data representative of a plurality of different sized regions of the image, values representative of the presence of features in said the regions; and

characterizing image points selected as being representative of features in said the image data on the basis of said detection by calculating characterization values for said the features, wherein said the characterization values are determined utilizing image data for regions of the image centred centered on said the features, and wherein the size of a said region for generating characterization data is selected on the basis of the size of said region utilized to detect said feature.

13. (Currently Amended) A method in accordance with claim 12, further comprising the steps of:

storing a plurality of sizes of regions for calculating characterization values; and

selecting from said the stored sizes the size of regions for calculating characterization values for a feature, wherein the size selected increases as the size of the region used to detect said that feature increases.

14. (Currently Amended) A method in accordance with claim 12, wherein said characterization step comprises generating characterization values which characterize each said region in a manner which is substantially independent of transformations resulting in linear distortions of the portion of said the image including said region.

15. (Currently Amended) A method in accordance with claim 14, wherein said characterization step comprises generating characterization values which characterize each said region in a manner which is substantially independent of rotational transformations of the portion of said the image in said that region.

16. (Currently Amended) A method in accordance with claim 15, wherein said characterization step utilizes is performed utilizing a substantially circular region to generate characterization values to characterize a feature, and wherein said the size of the circular region is selected on the basis of the size of said the feature detected [[by]] in said detection means step.

17. (Currently Amended) A method of identifying the correspondence between features in a pair of images, comprising generating characterization data in accordance with claim 12; and

determining a match between features in said the pair of images characterized [[by]] in said characterization step.

18. (Original) A method in accordance with claim 17, further comprising the step of generating a signal conveying information defining identified correspondences.

19. (Currently Amended) A method in accordance with claim 18, further comprising the step of recording said the signal on a recording medium either directly or indirectly.

20. (Currently Amended) A method of generating three-dimensional models from images of objects taken from different viewpoints comprising:

identifying the correspondence between features in images in accordance with claim 17;

determining the relative positions from which said images were obtained on the basis of said the correspondence; and

generating a three-dimensional model of an object on the basis of said the image data and said the relative positions.

21. - 68. (Canceled).

69. (Currently Amended) In a method for generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;

detecting the presence of features in the images represented by stored image data utilizing a plurality of different sized regions of the images to determine values representative of the presence of features in said the image data;

characterizing image points selected as being representative of features in said the image data on the basis of said the values, utilizing different sized regions of said

the images for said the image points wherein the size of a region used to characterize [[and]] an image point is selected on the basis of the size of the region utilized to determine a value representative of the presence of features in said the image data for said the image point; and

matching said the features utilizing said the characterizations.

70. (Currently Amended) Apparatus for generating characterization data characterizing an image comprising:

a data receiver for receiving image data representative of an image;

a feature detector for detecting a plurality of features in an image represented by image data received by said data receiver; and

a feature characteriser characterizer for characterising features detected by said feature detector, said feature characteriser characterizer being arranged to characterise characterize portions of image data representative of regions of an image including features detected by said feature detector, wherein said feature characteriser is arranged to generate characterization data for a said region of an image such that said the characterization is substantially unaffected by transformations resulting in linear distortions of said that region causing stretch and skew.

71. (Currently Amended) Apparatus in accordance with claim 72, wherein said feature detector is arranged to detect a plurality of different sizes of features, and wherein said feature characteriser characterizer is arranged to use the size of a feature

detected by said feature detector to select the size of a said region used to generate characterization data for a said feature.

72. (Currently Amended) Apparatus in accordance with claim 70, wherein said feature characteriser characterizer is arranged to determine the shape of a region to be used to generate characterization data for a feature on the basis of values of image data for a region of said the image including said that feature so that said the characterization is substantially unaffected by transformations resulting in linear distortions causing stretch and skew of said that region of said the image.

73. (Currently Amended) Apparatus in accordance with claim 70, wherein said feature characteriser characterizer comprises:

 a luminance determinator for determining the rate of change of luminance along two axes for a said region of said the image;

 an image transformer for determining a transformed image utilizing said the rates of change of luminance determined by said luminance detector; and

 a characterisation characterization generator for generating characterization data characterizing a said region of said the image utilizing said the transformed image.

74. (Currently Amended) Apparatus in accordance with claim 72, wherein said data receiver is arranged to receive image data representative of pixels within a said image, and said characterization data generator comprises:

an average second moment matrix determinator for determining for a said region an averaged second moment matrix for a feature, wherein said the averaged second moment matrix comprises a scaled sum of second moment matrices for each pixel in said that region, and said the second moment matrices matrix for each of said the pixels comprises:

$$M = \begin{pmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{pmatrix}$$

where I_x and I_y are values indicative of the rate of change of luminance of an image along two different axes; and

a transformed region determinator for determining for a said region of said the image including a said feature a transformed image for said that region transformed to account for distortions arising from stretch and skew on the basis of said the averaged second moment matrix determined for said that region by said average second moment matrix determinator, said characterization data generator being arranged to calculate characterisation characterization values for a said feature on the basis of the calculation of rotational invariants determined for a transformed image for said that region including said the feature transformed by said transformed region determinator.

75. (Currently Amended) Apparatus in accordance with claim 74, wherein said transformed region determinator is arranged to determine a transformed image

by interpolating values for an inverse square root of a second moment matrix determined by said average second moment matrix determinator for said that region to determine a transformed image representative of said the region of said the original image transformed by the square root of said the second moment matrix multiplied by a scaling factor.

76. (Currently Amended) Apparatus in accordance with claim 75, wherein said the scaling factor is inversely proportional to the square root of the determinant of the averaged second moment matrix for a said region.

77. (Currently Amended) Apparatus in accordance with claim 76, wherein said transformed region determinator is arranged to generate transformed image data for a said region of said the image until the calculated second moment matrix determined by said second moment matrix determinator for said the transformed image is equal to identity, and wherein said feature characteriser characterizer is arranged to characterize a said feature on the basis of said the iteratively transformed image data.

78. (Currently Amended) Apparatus in accordance with claim 70, further comprising a feature associator for identifying matches between features in pairs of images, wherein said feature associator is arranged to determine a match between features in pairs of images on the basis of characterization by said feature characteriser characterizer of features in said the pair of images.

79. (Currently Amended) Apparatus in accordance with claim 78, further comprising:

a data store for storing characterization data for features in a plurality of images[[],]; and

a feature associator, said feature associator being arranged to determine, utilizing the characterization of features of received image data characterized by said feature characteriser characterizer, a match between features in said the received image data and features defined by characterization values stored in said data store.

80. (Currently Amended) Apparatus for generating data defining a three-dimensional computer model of an object comprising:

apparatus for identifying matches between features in pairs of images in accordance with claim 78;

a viewpoint determinator for determining on the basis of the matching of features in a pair of images by said apparatus the relative viewpoints from which said images have been recorded; and

a model generator for generating data defining a three-dimensional computer model of the object utilizing said the image data in said the images and said the determination of the relative viewpoints from which said the images have been recorded by said viewpoint determinator.

81. - 86. (Canceled).

87. (Currently Amended) A method for generating characterization data characterizing an image comprising the steps of:

receiving image data representative of an image;
detecting a plurality of features in said the image; and
generating characterization data, characterising said the features, by
generating data characterising portions of said the image data representative of regions of
images including said the features, wherein said generation step is such that said the
characterization data generated is substantially unaffected by transformations resulting in
linear distortions of said the regions including said the features causing stretch and skew.

88. (Currently Amended) A method in accordance with claim 87,
wherein said determination step comprises detecting a plurality of different sized features,
and wherein said characterisation characterization step includes selecting the size of a
region to characterize a said feature on the basis of said the size of a said feature.

89. (Currently Amended) A method in accordance with claim 87,
wherein said generation step comprises for each of said the features determining the shape
of a region to be used to characterize a said feature on the basis of values of image data for
a region of said the image including said that feature so that said characterization is
substantially unaffected by transformations resulting in linear distortions of said the region
of said the image.

90. (Currently Amended) A method in accordance with claim 87, wherein said generation step comprises the steps of:

determining the rate of change of luminance along two axes for said regions of said the images;

determining transformed images utilizing said the rates of change of luminance; and

generating characterization data for said the features utilizing said the transformed images.

91. (Currently Amended) A method in accordance with claim 89, wherein said characterization step comprises the steps of:

determining for a said region of an image including a feature an averaged second moment matrix for said the feature, wherein said the averaged second moment matrix comprises a scaled sum of second moment matrices for each pixel in said that region, and said the second moment matrices matrix for each of said the pixels comprises:

$$M = \begin{pmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{pmatrix}$$

where I_x and I_y are values indicative of the rate of change of luminance of an image along two different axes; and

determining for said that region of said the image including said the feature a transformed image transformed to account for distortions arising from sketch and skew on the basis of said the second moment matrix determined for said that region; and calculating characterisation characterization values for a feature on the basis of the calculation of rotational invariants determined for said the transformed image.

92. (Currently Amended) A method in accordance with claim 91, wherein the determination of a transformed image comprises determining a transformed image corresponding to the selected region transformed by the square root of said the second moment matrix for said that region scaled by a scaling factor.

93. (Currently Amended) A method in accordance with claim 92, wherein said the scaling factor is proportional to the square root of the determinant of said the second moment matrix determined for said that region.

94. (Currently Amended) A method in accordance with claim 93, wherein said the determination of a transformed image comprises determining a transformed image by interpolating values for the origins of pixels in the transformed image transformed by the inverse square root of said the second moment matrix multiplied by a scaling factor, to determine a transformed image representative of said the original image region transformed by the square root of said the second moment matrix multiplied by a scaling factor, wherein said the scaling factor is inversely proportional to the determinant of the second moment matrix for a said feature.

95. A method in accordance with claim 94, wherein said transformation step comprises iteratively generating transformed image data for a said region of said the image until the calculated second moment matrix for said the transformed image is substantially equal to identity, and said characterization comprises ~~means~~ characterizing said the feature on the basis of said the iteratively transformed image data.

96. (Currently Amended) A method of identifying correspondences between features in pairs of images, comprising the steps of:
generating characterization data for images in accordance with claim 87; and
determining a match between features in pairs of images utilizing said the characterization data.

97. (Currently Amended) A method in accordance with claim 96 further comprising the step of generating a signal conveying information defining said the correspondences.

98. (Currently Amended) A method in accordance with claim 97, further comprising the step of recording said the generated signal on a recording medium either directly or indirectly.

99. (Currently Amended) A method for generating a three-dimensional model from images of objects comprising the steps of:

identifying the correspondence between features in pairs of images in accordance with claim 96;

determining on the basis of the correspondence of features on a pair of images the relative viewpoints from which said the images have been obtained; and

generating a three-dimensional model of an object utilizing said the image data and said the determination of the relative viewpoints from which said the image data has been obtained.

100. - 103. (Canceled).

104. (Currently Amended) In an apparatus for generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;

detecting the presence of features in the images represented by stored image data[[,]];

generating characterization data for said the features in the images in a manner substantially unaffected by linear distortions of regions of said the images including a said feature causing stretch and skew; and

matching features in different images utilizing said the generated characterization data.

105. (Currently Amended) In an apparatus for processing data defining images of an object to generate a three-dimensional computer model of the object by matching features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface of the object using the calculated viewpoints, a method of performing the processing to match the features in the images comprising:

storing image data;
detecting the presence of features in the images represented by stored image data[[,]];

generating characterization data for said the features in the images in a manner substantially unaffected by linear distortions of regions of said the images including a said feature causing stretch and skew; and

matching features in different images utilizing said the generated characterization data.

106. (Currently Amended) In a method for generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional

computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;

detecting the presence of features in the images represented by stored image data[[,]];

generating characterization data for said the features in the images in a manner substantially unaffected by linear distortions of regions of said the images including a said feature causing stretch and skew; and

matching features in different images utilizing said the generated characterization data.

107. (Currently Amended) An apparatus for identifying features in images comprising:

an image receiver for receiving data representative of an image;

a feature detector for detecting the presence of features in images the image represented by image data received by said image receiver, said feature detector being arranged to determine, for image data representative of a plurality of different sized regions of said the image, values representative of the presence of features in said the regions; and

a selector for selecting image points as being representative of features in said the image data on the basis of said detection by said feature detector,[[;]]
characterised in that:

wherein said feature detector is arranged to scale said the values indicative of the presence of a feature in an image to account for variation in said the values arising due to the size of the region used to determine said the values.

108. (Currently Amended) An apparatus in accordance with claim 107, wherein said feature detector is arranged to scale said the values by changing each of said the values utilizing scaling factors proportional to the areas of regions used to determine said the values.

109. (Currently Amended) An apparatus in accordance with claim 108, wherein said feature detector is arranged to scale said the values by dividing each of said the values by said the scaling factors.

110. (Currently Amended) An apparatus in accordance with claim 107, wherein said selector is arranged to select points as being representative of features within images on the basis of said the scaled values generated by said feature detector which exceed a predetermined threshold.

111. (Currently Amended) Apparatus in accordance with claim 107, wherein said selector is arranged to select a predetermined number of image points as being representative of features by comparing scaled values determined by said feature detector and selecting points being associated with values most strongly indicative of the presence of features.

112. (Currently Amended) Apparatus in accordance with claim 107, wherein said feature detector is arranged to determine the value for a region utilizing an averaged value indicative of the presence of a feature in an image calculated for a said region of said the image, and to scale said the determined value.

113. (Currently Amended) An apparatus in accordance with claim 112, wherein said feature detector is arranged to, for each of said the plurality of different sized regions:

- (a) determine a smoothed image wherein each of the values for pixels in said the smoothed image are determined on the basis of an averaged value for pixels in the said that region in said the original image;
- (b) to determine characterization values for each of said the pixels in said the smoothed image indicative of the presence of a feature in said that region; and
- (c) to determine from pixels in said the smoothed image a value indicative of an averaged characterization value for a region of said the smoothed image, said the size of said the smoothed image region being proportional to said the size of said the region used to generate said the smoothed image.

114. (Currently Amended) Apparatus in accordance with claim 113, wherein said characterisation the characterization values comprise values indicative of the rate of change of luminance of pixels in said the smoothed image.

115. (Currently Amended) Apparatus in accordance with claim 114, wherein said feature detector is arranged to generate said the values indicative of the presence of a said feature by calculating values for Harris corner strengths for said the points, divided by a scaling factor proportional to the square of the area of the region of image used to determine said the Harris corner strengths.

116. (Currently Amended) Apparatus in accordance with claim 107, further comprising a feature characteriser characterizer for characterising characterizing image points selected by said selector, said feature characteriser characterizer being arranged to characterize a selected image point on the basis of image data representative of a region of said the image including said the selected image point.

117. (Currently Amended) Apparatus in accordance with claim 116, wherein said feature characteriser characterizer is arranged to vary the size of a said region for characterizing an image point so that said the size of said region is proportional to the size of the region utilized by said the feature detector to determine a value which resulted in the selection by said selector of said the image point, included in said region.

118. (Currently Amended) Apparatus in accordance with claim 117, wherein said feature characteriser characterizer is arranged to characterise said characterize the region in a manner which is substantially independent of affine transformations of the image data of said the region.

119. (Currently Amended) Apparatus in accordance with claim 116, further comprising a match identifier for identifying matches between features in a pair of images, wherein said match identifier is arranged to determine a match between image points in said the pair of images characterised characterized by said feature characteriser characterizer.

120. (Currently Amended) Apparatus in accordance with claim 118, further comprising a data store for storing characterisation characterization values associated with image points in a plurality of images, and a match identifier, said match identifier being arranged to determine on the basis of said characterisation characterization of features by said feature characteriser matches between image points in the image data received by said image receiver and image points associated with characterization values stored in said data store.

121. (Currently Amended) An apparatus for generating a three-dimensional computer model of an object comprising:
apparatus for identifying matches between features in pairs of images in accordance with claim 119;
a viewpoint determinator for determining on the basis of the matches the relative view points from which said the images have been obtained; and
a model generator for generating a three-dimensional computer model of an object utilizing said the image data received by said image receiver and said the

determination of the relative view points from which ~~said the~~ image data has been obtained determined by said viewpoint determinator.

122. (Currently Amended) In an apparatus for generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;

detecting the presence of features in the images represented by the stored data, by determining, for image data representative of a plurality of different sized regions of a ~~said given~~ image from among the images, values representative of the presence of features in ~~said the~~ regions, and scaling ~~said the~~ values to account for variation in ~~said the~~ values arising due to the size of the region used to determine ~~said the~~ values; and

selecting image points as being representative of features in ~~said the~~ image data on the basis of ~~said the~~ scaled values.

123. (Currently Amended) In an apparatus for processing data defining images of an object to generate a three-dimensional computer model of the object by matching features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model

of the surface of the object using the calculated viewpoints, a method of performing the processing to match the features in the images comprising:

storing image data;

detecting the presence of features in the images represented by stored image data, comprising determining for image data representative of a plurality of different sized regions of a said given image from among the images, values representative of the presence of features in said the regions, and scaling said the values to account for variation in said the values arising due to the size of the region used to determine said the values; and

selecting image points as being representative of features in said the image data on the basis of said the scaled values.

124. (Currently Amended) A method for identifying features in images comprising the steps of:

storing image data;

detecting the presence of features in images represented by stored image data, said detection step comprising determining for image data representative of a plurality of different sized regions of said a given image from among the images, values representative of the presence of features in said the regions; and

selecting image points as being representative of features in said the image data on the basis of said detection step, characterised in that wherein said detection step includes the step of scaling said the values indicative of the presence of a feature in an image to account for variation in said the values arising due to the size of the region used to determine said the values.

125. (Currently Amended) A method in accordance with claim 124, wherein said scaling step comprises changing each of said the values utilizing scaling factors proportional to the areas of the regions used to determine said the values.

126. (Currently Amended) A method in accordance with claim 125, wherein said scaling step comprises scaling said the values by dividing each of said the values by said the scaling factors.

127. (Currently Amended) A method in accordance with claim 124 wherein said selection step comprises selecting image points as being representative of features on the basis of said the scaled values determined for a region including a said point exceeding a predetermined threshold.

128. (Original) A method in accordance with claim 124, wherein said selection step comprises selecting a predetermined number of image points as being representative of features by comparing scaled values determined for regions and selecting points associated with values most strongly indicative of the presence of features.

129. (Currently Amended) A method in accordance with claim 124, wherein said detection step comprises determining the value for a region utilizing an averaged value indicative of the presence of a feature in an image calculated for a said region of said the given image, and scaling said the determined value.

130. (Currently Amended) A method in accordance with claim 129, wherein said detection step comprises, for each of ~~said~~ the plurality of different sized regions;

(a) determining a smoothed image wherein each of the values for pixels in ~~said~~ the smoothed image are determined on the basis of an averaged value for pixels in ~~the~~ said that region in ~~said~~ the original image;

(b) determining characterization values for each of ~~said~~ the pixels in ~~said~~ the smoothed image indicative of the presence of a feature in ~~said~~ that region; and

(c) determining from pixels in ~~said~~ the smoothed image a value indicative of an averaged characterization value for a region of ~~said~~ the smoothed image, ~~said~~ the size of ~~said~~ the smoothed image region being proportional to ~~said~~ the size of ~~said~~ the region used to generate ~~said~~ the smoothed image.

131. (Currently Amended) A method in accordance with claim 130, wherein said characterisation values comprise values indicative of the rate of change of luminance of pixels in ~~said~~ the smoothed image.

132. (Currently Amended) A method in accordance with claim 131, wherein said detection ~~means is arranged to generate said~~ step includes generating values indicative of the presence of a said feature by calculating values for Harris corner strengths for ~~said~~ the points, divided by a scaling factor proportional to the square of the area of the region of image used to determine ~~said~~ the Harris corner strength.

133. (Currently Amended) A method of characterizing features in images comprising the steps of selecting image points in accordance with claim 124, and characterizing features, on the basis of image data representative of regions of said the image including said the image points.

134. (Currently Amended) A method in accordance with claim 133, wherein said characterization step comprises selecting the size of a said region for characterizing a feature so that said the size of a region for characterizing a feature is proportional to the size of the region utilized to determine a value utilized to select said the image point, included in said that region.

135. (Currently Amended) A method in accordance with claim 124, wherein said characterisation characterization step comprises characterizing said that region in a manner which is substantially independent of affine transformations of the image data of said that region.

136. (Currently Amended) A method of identifying the correspondence between features in pairs of images comprising the steps of:
characterizing features in images in accordance with claim 133; and
identifying correspondence between features in a pair of images on the basis of said the characterization in said characterization step.

137. (Currently Amended) A method in accordance with claim 136,
further comprising the step of generating a signal conveying information defining identified
correspondences.

138. (Currently Amended) A method in accordance with claim 137,
further comprising the step of recording ~~said the~~ generated signal on a recording medium
either directly or indirectly.

139. (Currently Amended) A method of selecting an image from a
database of images comprising the steps of:
storing characterization values for features in a plurality of images stored in
a database;
characterizing an image in accordance with claim 133; and
selecting an image from an image database on the basis of a comparison of
~~said the~~ characterization of ~~said that~~ image and ~~said the~~ stored characterization values for
features in images in ~~said the image~~ database.

140. (Currently Amended) A method of generating a three-dimensional
model of an object comprising the steps of:
identifying a correspondence between features in pairs of images in
accordance with claim 136;
determining on the basis of the correspondence of features in a pair of
images the relative view points from which ~~said the~~ images have been obtained; and

generating a three-dimensional model of an object utilizing said the image data and said the determination of the relative view points from which said the image data has been obtained.

141. (Currently Amended) In a method of generating a three-dimensional computer model of an object by processing images of the object taken from a plurality of different viewpoints to match features in the images, calculating the viewpoints at which the images were recorded using the matched features, and generating a three-dimensional computer model of the surface object using the calculated viewpoints, an improvement comprising matching features in the images by:

storing image data;
detecting the presence of features in the images represented by stored image data, comprising determining for image data representative of a plurality of different sized regions of a said given image from among the images, values representative of the presence of features in said the regions, and scaling said the values to account for variation in said the values arising due to the size of the region used to determine said the values; and
selecting image points as being representative of features in said the image data on the basis of said the scaled values.

142. (Currently Amended) A storage medium storing processor implementable instructions for causing a programmable processing apparatus to become operable to perform a method in accordance with at least any one claim selected from the set of claims 12 to 20, 37 to 53 or 61 to 68, 87 to 99, and 103 or 124.

143. (Currently Amended) A signal conveying processor implementable instructions for causing a programmable processing apparatus become operable to perform a method in accordance with ~~at least any one claim selected from the set of claims 12 to 20, 37 to 53 or 61 to 68, 87 to 99, and 103 or 124.~~

144. (Currently Amended) An apparatus for generating characterization data characterizing features in an image comprising:

input means for receiving data representative of an image;
detection means for detecting the presence of features represented by image data received by said input means, said detection means being arranged to determine, for image data representative of a plurality of different sized regions of the image, values representative of the presence of features in said the regions; and
characterization means for characterizing image points selected as being representative of features in said the image data on the basis of said the detection by said detection means, by calculating characterization values for said the features, wherein said the characterization values are determined utilizing image data for regions of the image including said the feature, and wherein said characterization means is arranged to determine said the characterization values on the basis of image data for different sized regions, said the size of said a given region being selected on the basis of the size of a said region utilized to detect said the feature by said detection means.

145. (Canceled).

146. (Currently Amended) Apparatus for generating characterization data characterizing an image comprising:

input means for receiving data representative of an image;

feature detection means for detecting a plurality of features in the image;

and

characterization means for ~~characterising~~ characterizing the features, said ~~characterisation~~ characterization means being arranged to ~~characterise~~ characterize portions of ~~said~~ the image data representative of regions of ~~said~~ the image including ~~said~~ the features, wherein said ~~characterisation~~ characterization means is arranged to generate characterization data for a region of ~~said~~ the image such that ~~said~~ the characterization is substantially unaffected by ~~transformations resulting in linear distortions of~~ ~~said~~ that region causing stretch and skew.

147. and 148. (Canceled).